December 2011 MSS/LPS/SPS Joint Subcommittee Meeting
ABSTRACT SUBMITTAL FORM

The submission of an abstract is an agreement to complete a final paper for publication and attend the meeting to present this information. Complete all information requested in the author and co-author information sections; the first author listed will receive paper acceptance notices and all correspondence. Abstracts must be submitted electronically; submittal instructions are located in the call for papers. **The abstract deadline date is June 13, 2011.**

ABSTRACT INFORMATION

Title: Experimental Determination of the Dynamic Hydraulic Transfer Function for the J-2X Oxidizer Turbopump-Part Two-Results and Interpretation

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MANAGEMENT APPROVAL

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Unclassified Abstract

(250-300 words; do not include figures or tables)

Experimental Waterflow Determination of the Dynamic Hydraulic Transfer Function for the J-2X Oxidizer Turbopump-Part Two-Results and Interpretation

Experimental results describing the hydraulic dynamic pump transfer matrix (Yp) for a cavitating J-2X oxidizer turbopump inducer+impeller tested in subscale waterflow are presented. The transfer function is required for integrated vehicle pogo stability analysis as well as optimization of local inducer pumping stability. Dynamic transfer functions across widely varying pump hydrodynamic inlet conditions are extracted from measured data in conjunction with 1D-model based corrections. Derived Dynamic transfer functions are initially interpreted relative to traditional Pogo pump equations. Water-to-liquid oxygen scaling of measured cavitation characteristics are discussed. Comparison of key dynamic transfer matrix terms derived from waterflow testing are made with those implemented in preliminary Ares Upper Stage Pogo stability modeling. Alternate cavitating pump hydraulic dynamic equations are suggested which better reflect frequency dependencies of measured transfer matrices.